Small, medium, larger or supersize?

Vermeer, W.M.

2011

document version
Publisher's PDF, also known as Version of record

CHAPTER 8

Value-for-money or making the healthy choice? The impact of proportional pricing on consumers' portion size choices

Willemijn M. Vermeer

Esther Alting

Ingrid H.M. Steenhuis

Jacob C. Seidell

European Journal of Public Health, 2009; 20: 65-69.

ABSTRACT

Background: Large food portion sizes are determinants of a high caloric intake, especially if they have been made attractive through value size pricing (i.e. lower unit prices for large than for small portion sizes). The purpose of the two questionnaire studies that are reported in this paper was to assess the impact of proportional pricing (i.e. removing beneficial prices for large sizes) on people's portion size choices of high caloric food and drink items.

Methods: Both studies employed an experimental design with a proportional pricing condition and a value size pricing condition. Study 1 was conducted in a fast-food restaurant (n = 150) and study 2 in a worksite cafeteria (n = 141). Three different food products (i.e. soft drink, chicken nuggets in study 1 and a hot meal in study 2) with corresponding prices were displayed on pictures in the questionnaire. Outcome measures were consumers' intended portion size choices.

Results: No main effects of pricing were found. However, confronted with proportional pricing a trend was found for overweight fast-food restaurant visitors being more likely to choose small portion sizes of chicken nuggets (OR = 4.31,
p = .07) and less likely to choose large soft drink sizes (OR = .07, p = .04).

Conclusion: Among a general public, proportional pricing did not reduce consumers' size choices. However, pricing strategies can help overweight and obese consumers selecting appropriate portion sizes of soft drink and high caloric snacks. More research in realistic settings with actual behavior as outcome measure is required.

Key words: Food portion sizes; Obesity; Pricing strategies; Environmental interventions

INTRODUCTION

Environmental influences may contribute to a caloric intake that exceeds the daily requirements [1, 2]. One aspect of this environment is that people are exposed to large food portion sizes [3]. Although the long term effects of large portion sizes on body weight have not been experimentally investigated, it is observed that in the decades in which the prevalence of overweight and obesity has drastically increased, portion sizes of especially high energy foods have augmented as well [4, 5]. There is empirical evidence to support the position that large portion sizes enhance the consumption of food and beverages and that this is not sufficiently compensated for over time [6-11].

One of the reasons why large portions are preferentially consumed is value-for-money. As a marketing strategy, people can purchase a larger portion size for only a small surplus. Therefore, in many settings prices per gram are lower for large packages or portions than for small packages or portions [11]. This phenomenon is known as value size pricing. After taste, consumers regard costs as the most important factor determining dietary choices [12]. Furthermore, experimental research has shown that large packages encourage people to consume larger quantities, partly due to perceived lower food costs [11]. Another issue is that people find self-regulation of large portion sizes difficult at the moment of consumption. Once the food is stockpiled or served, many people are tempted to eat it all [13]. Hence, it seems that addressing consumers' size choices at the moment of purchase is more feasible than at the moment of consumption. In this respect, portion size pricing is likely an influential factor.

Pricing strategies could be used to stimulate smaller size choices by proportional pricing of small and large portions (i.e. removing beneficial prices for large sizes by keeping the price per gram stable along different sizes). On the whole, pricing strategies related to portion sizes are considered innovative [14] and might be a promising environmental intervention aimed at limiting people's consumption of large portion sizes of high caloric foods and drinks [15]. Studies have demonstrated the effectiveness of pricing strategies targeted at altering the *type* of food that consumers purchase [16, 17]. To our knowledge, only one American study is available on the impact of pricing strategies on portion size

choices [18]. The current study took into account additional explaining mechanisms such as value consciousness, sex, and income.

As the feasibility of implementing pricing strategies related to portion size might be challenging, a first step is to test its possible effectiveness on consumers' size choices by means of a questionnaire study. The purpose of the two studies reported in this paper was to assess the impact of proportional pricing on people's portion size choices of high caloric food and drink items. We expected that compared to value size pricing, proportional pricing would increase the preference for small sizes and decrease the preference for large sizes. The first study was conducted among fast-food restaurant visitors, the second study among employees visiting a worksite cafeteria.

STUDY 1

Methods

Participants and procedures

Participants were recruited on different weekdays in a Dutch fast-food restaurant. People older than 18, were requested to complete a questionnaire. Out of the 151 fast-food restaurant visitors who received the questionnaire, 150 (99.3%) returned the questionnaire.

Study design and procedures

The study employed an experimental design with a proportional pricing condition (experimental condition) and a value size pricing condition (control condition). In the value size pricing condition, prices were representative of market place prices. In the proportional pricing condition, prices were converted from the price of the medium size to the small and large sizes. Visitors of fast-food restaurants were approached after they had purchased their meal, and asked to complete the questionnaire. The two versions of the questionnaires were randomly handed out to the participants.

In the questionnaire, photographs of different sizes of foods and drinks were presented with corresponding prices that differed depending on the study condition. In order to give participants an impression of the actual size, a pair of dice or cutlery was

displayed on each picture. In the study among fast-food restaurant visitors, participants were asked to choose a portion size of soft drink and chicken nuggets. Table 8.1 gives an overview of the prices in the different conditions.

Table 8.1 Study conditions and prices in study 1 and study 2

Study 1 - Fast-food restaurant				
	Condition	Small	Medium	Large
Soft drink	Proportional pricing	€ 1.15	€ 1.80	€ 2.25
	Value size pricing	€ 1.65	€ 1.80	€ 2.00
Chicken	Proportional pricing	€ 2.35	€ 3.50	€ 5.80
nuggets	Value size pricing	€ 2.75	€ 3.50	€ 5.00
Study 2 – Worksite cafeteria				
Hot meal	Proportional pricing	€ 2.35	€ 3.50	
	Value size pricing	€ 2.80	€ 3.50	

Food products and available sizes

Soft drinks and chicken nuggets were chosen as stimuli as they contain many calories and have been found to be associated with obesity [19, 20]. For soft drink, three sizes (i.e. 250, 400, and 500 milliliter) were available. Guidelines from the *Netherlands Nutrition Centre*[2] define one serving portion of soft drink as 225 milliliters. However, as 225 milliliter cups were not the market standard, we designated 250 milliliters as the reference portion.

With respect to chicken nuggets, three basket sizes (i.e. containing 6, 9, or 15 chicken nuggets) were available. Based on the fact that chicken nuggets are high in calories (i.e. 42 calories per nugget, [21]), the basket containing 6 chicken nuggets was chosen as the reference size.

[2] Institution funded by the Dutch government that provides information and education about healthy nutrition.

Measures

The questionnaire started with asking participants which portion size they would choose from the options that were presented.

In addition, several control variables, that were expected to be related to size choices, were included in the questionnaire. First, hunger and thirst at the moment of completing the questionnaire were measured with two Visual Analogue Scales (VAS) ranging from 0 cm (not at all hungry/thirsty) to 10 cm (very hungry/thirsty).

Second, the dietary restraint and external disinhibition scales derived from the Dutch Eating Behavior Questionnaire (DEBQ, [22]) were included in the questionnaire. Both scales have been proven to be reliable and valid [23]. The dietary restraint scale consisted of ten 5-point scaled items (e.g. *"Do you try to eat only a little when you want to eat a lot?"*), with α = .93. External disinhibition was measured with ten 5-point scaled items (e.g. *"If food smells yummy, do you eat a lot of it?"*), with α = .79.

Third, value consciousness was measured with seven items 7-point scaled items (e.g. "*I always check prices at the retail store to be sure I get the best value for the money I spend"*) [24] with α =.73.

Fourth, participants were asked a number of questions regarding their soft drink and chicken nuggets consumption (i.e. general consumption frequency, and whether they made a habit of drinking diet or regular soft drinks).

Last, a number of questions were included in the questionnaire about gender, age, length, body weight, and gross annual income (i.e. between €0 and €10.000, €10.000 and €20.000, €20.000 and €30.000, €30.000 and €40.000, €40.000 and €50.000, or €50.000 and higher).

Data Analysis

The main outcome variables in this study were participants' soft drink size and chicken nuggets size choices. To assess the impact of pricing, participants' size choices were dichotomized and coded in two different manners. First, the size choices were dichotomized in order to assess whether labeling *encouraged* participants to choose the reference size.

Therefore, participants' size choices were either coded as the reference sizes (i.e. 250 milliliter of soft drink and 6 pieces of chicken nuggets) or as being larger.

Second, size choices were dichotomized in order to assess the effect of labeling on *discouraging* participants from choosing the largest size. Data were either dichotomized as choosing the largest size (i.e. 500 milliliter of soft drink and 15 pieces of chicken nuggets) or not. Logistic regression analyses were conducted with the likelihood of choosing the reference sizes or largest size as outcome variables. As there was a significant difference in value consciousness between the experimental and the control condition, in the logistic regression analysis we adjusted for value consciousness. Interaction effects were assessed between pricing and age, sex, overweight status, value consciousness and income.

Results for main effects were considered significant with $p < .05$, for interaction-effects results were considered significant with $p <. 1$.

Results

Descriptive statistics

The majority of the participants were female (66.4%). The participants' mean age was 25.22 years (SD = 9.88). Based on self-reported height and body weight, 3.5% of the participants were underweight (BMI < 18.50), 72.7% had a normal weight (BMI 18.50-24.99), 17.5% was overweight (BMI 25.00-29.99), and 6.3% was obese (BMI ≥ 30.00). The overweight and obesity prevalence was lower than in the general Dutch population (i.e. 46% is overweight or obese, [25]). Participants' mean incomes were low with 12.4% reporting a gross annual income higher than the Dutch modal annual income (i.e. €30.000, - in 2007, [26]) With respect to participants' consumption patterns, 54.4% has made a habit out of eating chicken sometimes or more frequently. Further, 82.3% drank soft drink on a regular basis. Other participant characteristics can be found in Table 8.2.

Table 8.2 Participant characteristics

Sample	Fast-food restaurant Mean (SD)	Worksite cafeteria Mean (SD)
Age	25.2 (9.9)	35.9 (10.9)
BMI	23.3 (4.4)	23.5 (3.5)
Hunger	3.9 (2.8)	4.2 (2.4)
Thirst	5.4 (2.9)	5.0 (2.5)
Dietary restraint	2.5 (.9)	2.7 (.8)
External disinhibition	2.9 (.6)	2.9 (.4)
Value consciousness	3.7 (1.2)	3.2 (1.2)

Soft drink size choices

Overall, 28.2% chose the reference size of soft drink, see Table 8.3. Neither main effects nor interaction effects for pricing were found on the likelihood to choose the reference size.

With respect to the likelihood to choose the largest size, a significant interaction effect of overweight status and pricing was found (p = .06). Among normal weight participants, pricing strategies had no effect on the likelihood to choose the largest size. However, among participants who were overweight or obese proportional pricing reduced the likelihood to choose the largest size (OR = .07, p = .04, CI: .01 – .83).

Chicken nuggets size choices

Table 8.3 shows that overall, 49.0% chose the reference size of chicken nuggets. With respect to the impact of pricing on the likelihood to choose the reference size, two significant interaction effects were found. First, there was an interaction between sex and pricing (p = .01). Men seemed more likely to choose the reference size when confronted with proportional pricing (OR = 3.35, p = .06, CI: .96 – 11.73). However, for women the opposite was found with proportional pricing decreasing the likelihood to choose the reference size (OR = .41, p = .04, CI: .18 – .94). Second, an interaction effect was found for overweight status and pricing (p = .02). Among participants with a normal weight, pricing did not have any effect. However, among participants who were overweight or obese, there was

a trend of proportional pricing increasing the likelihood to choose the reference size (OR = 4.31, p = .07, CI: .88 – 21.12).

With respect to the impact of pricing on the likelihood of choosing one of the largest sizes, neither main effects nor interaction effects were found.

Table 8.3 Participants' size choices in study 1

	Soft drink			**Chicken nuggets**		
	Small	**Medium**	**Large**	**Small**	**Medium**	**Large**
Entire sample (n = 137)						
Overall	28.2%	53.0%	18.8%	49.0%	44.3%	6.7%
Proportional	29.3%	56.0%	14.7%	47.3%	47.3%	5.4%
Value size pricing	27.0%	50.0%	23.0%	50.7%	41.3%	8.0%
	χ^2 (1) = .1, p = .8			χ^2 (1) = .2, p = .7		
Participants with a healthy weight (n = 104)						
Overall	26.9%	52.9%	20.2%	49.5%	41.7%	8.7%
Proportional	28.6%	51.0%	20.4%	41.7%	50.0%	8.3%
Value size pricing	25.5%	54.5%	20.0%	56.4%	34.5%	9.1%
	χ^2 (2) = .16, p = .9			χ^2 (2) = 2.60, p = .3		
Participants who are overweight or obese (n = 33)						
Overall	33.3%	50.0%	16.7%	44.1%	52.9%	2.9%
Proportional	33.3%	66.7%	0%	55.0%	45.0%	0%
Value size pricing	33.3%	33.3%	33.3%	28.6%	64.3%	7.1%
	χ^2 (2) = 2.67, p = .3			χ^2 (2) = 3.31, p = .2		

STUDY 2

Methods

Participants and procedures

Participants were recruited on different weekdays in a worksite cafeteria located in a hospital. Out of the 143 worksite cafeteria visitors who received the questionnaire, 141 (98.6%) completed the questionnaire.

Study design and procedures

The study design and procedures were comparable to study 1, see Table 8.1 for an overview of the study conditions and prices.

Food products and available sizes

A hot meal was chosen as test food. Although, hot meals constitute of valuable nutrients, in worksite cafeterias they are generally offered in one large size only (i.e. approximately 500 grams). Small hot meals (i.e. approximately 300 grams) might be more suitable for people with a sedentary lifestyle and/ or who are overweight or obese better than large meals. For instance, Spaghetti Bolognese consists of 121 calories per 100 grams [27]. Consequently, if not compensated for, selecting a small portion of this dish would reduce the caloric intake with 242 calories. Even small reductions in daily caloric intake can prevent long-term weight gain. For instance, Hill and colleagues estimated that reducing the daily energy intake with 100 calories could prevent weight gain in most of the population. The same researchers suggest that this can be achieved by for instance eating a few less bites at each meal [28].

Measures

The questionnaire was similar to the questionnaire used in study 1. The dietary restraint scale was reliable with α = .93, the external disinhibition scale had a reliability of α = .73, and for value consciousness α = .84.

Data analysis

The main outcome variable was participants' portion size choices of a hot meal. Logistic regression analyses were conducted with the likelihood of choosing the small meal as outcome variable. Further, the same data analysis procedures were applied compared to study 1.

Results

Among worksite cafeteria visitors, the majority of the participants were female (65.7%). The participants' mean age was 35.85 years (SD = 10.94). Based on self-reported height and body weight, 5.3% of the participants were underweight (BMI < 18.50), 67.9% had a normal weight (BMI 18.50-24.99), 22.9% was overweight (BMI 25.00-29.99), and 3.8% was obese (BMI ≥ 30.00) Further, 49.6% of the participants reported a gross annual income higher than the Dutch gross modal annual income. Further, 21% sometimes consumed a hot meal in the worksite cafeteria (4.3% often and 2.9% almost always). Other participant characteristics can be found in Table 8.2.

Hot meal size choices

In the worksite cafeteria sample, irrespective of the experimental condition, the majority (86.2%) of the participants chose the reference size. Further, Table 8.4 shows that for participants with a healthy weight proportional pricing led to an increase of 13.5% that chose the reference size, χ^2 (1) = 3.91, p = .05 . However, the logistic regression analysis neither showed significant main effects nor interaction effects for pricing strategies.

Table 8.4 Participants' size choices in study 2

	Hot meal	
	Medium	**Large**
Entire sample (n = 121)		
Overall	86.2%	13.8%
Proportional	90.0%	10.0%
Value size pricing	82.4%	17.6%
	χ^2 (1) = 1.70, p = .2	
Participants with a healthy weight (n = 87)		
Overall	88.5%	11.5%
Proportional	95.3%	4.7%
Value size pricing	81.8%	18.2%
	χ^2 (1) = 3.91, p = .05	
Participants who are overweight or obese (n = 34)		
Overall	82.4%	17.6%
Proportional	85.0%	15.0%
Value size pricing	78.6%	21.4%
	χ^2 (1) = .23, p = .62	

DISCUSSION

The purpose of both studies reported in this paper was to assess the impact of proportional pricing of high caloric food and drinks on consumers' portion size choices. Results show that among the general population, proportional prices did not have an effect on consumers' size choices. However, among specific subgroups pricing strategies related to portion size were effective. Among fast-food restaurant visitors who were overweight or obese, proportional pricing led to fewer choices for the largest soft drink size and more choices for the reference size of chicken nuggets. Surprisingly, proportional pricing of chicken nuggets had a

(marginally significant) beneficial effect on men, but a detrimental effect on women. We do not have an explanation for this finding. Among worksite cafeteria visitors with a healthy weight, proportional pricing increased the likelihood to choose the reference size of a hot meal.

Although based on a small sample, it is promising that in the fast-food restaurant study proportional pricing seemed effective among participants who were overweight or obese, as these consumers comprise an important target group for this type of environmental interventions. However, no such effect was found among worksite cafeteria visitors. More research is necessary to gain insight into the question *why* people who are overweight would be more sensitive to such pricing strategies than people with a healthy weight. We assessed whether overweight and obese participants were more value consciousness, externally disinhibited or dietary restrained than participants with a healthy weight. Indeed, overweight fast-food restaurant visitors were more strongly restrained than visitors with a normal weight. However, no differences were found in value consciousness and external disinhibition. Our data also ruled out the possibility that, irrespective of pricing, participants with a healthy weight were more likely to choose smaller sizes than participants who were overweight, which could have overridden the effect of pricing. More research among overweight and obese people is necessary to gain insight into the question why these individuals seem more sensitive to proportional pricing of fast-food than people with a healthy weight. Quantitative studies among specific target groups are necessary to replicate these results and to assess whether pricing strategies also affect actual purchase behavior rather than intended behavior. Further, qualitative studies should address underlying cognitive and affective motives related to pricing and purchase behavior.

With respect to the fact that in both studies we did not find any effects of pricing among the general population, some aspects are worth mentioning. Firstly, it is uncertain to what extent participants have paid attention to or even noticed the prices and price proportions. As mentioned in the introduction, value size pricing is standard in most point-of-purchase settings. Further, as our environment is complex and food decisions have to be made swiftly (people make around 200 food decisions every day, [29]), consumers are likely to have limited cognitive and computational resources available for these decisions. This

could induce consumers to base their size choices on heuristics [30]. Therefore, it is conceivable that participants, expecting value size pricing [11], were not inclined to calculate the price per gram and did not notice the proportional prices. In a comparable study on the impact of proportional pricing on size choices, no effects were found [18]. Based on the study from Harnack and colleagues and the findings from our study, it seems that when implementing pricing strategies, attention should be given to putting emphasis on the altered price proportions. Otherwise, there is a risk that consumers continue assuming that large sizes are advantageous from an economic point of view. Multiple exposures to or explicit communication of proportional prices (for instance by communicating the prices per gram) might be necessary for drawing attention to pricing strategies related to portion sizes.

One of the strengths of the studies reported in this paper was that the sample comprised of a wide range of consumers, in all probability representative of general fast-food restaurant and worksite cafeteria consumer populations. However, both samples had a lower overweight and obesity prevalence than the Dutch population, which might be explained by a tendency to underreport body weight [31]. Further, the fast-food restaurant sample was relatively young and BMI levels increase with age [25]. Another strength of this study was that the questionnaire that was used included relevant measures directed at explaining the study findings.

A limitation of these studies was that pricing strategies were manipulated through different versions of a questionnaire, and that actual choice behavior was not assessed. This method was chosen was as a means to overcome practical boundaries related to the inclusion of various food products, and to facilitate the assessment of pricing strategies in different settings. Also, empirical research has shown that people's virtual choices correspond strongly with their actual purchase and consumption behavior [32]. Nevertheless, additional experimental studies assessing the impact of pricing strategies on actual behavior in realistic settings are recommended. We would also suggest future studies to address the impact of repeated exposures to pricing strategies and communicating pricing strategies clearly. With respect to healthier foods such as fruits and vegetables, we have conducted some preliminary research on the effect of value size pricing of salads on the

likelihood to select large portion sizes, but did not find any effects. However, this issue merits further study.

In conclusion, pricing strategies can help overweight and obese consumers selecting appropriate portion sizes of soft drink and high caloric snacks. It is therefore advised to put an effort into policy development related to pricing strategies with respect to portion sizes of foods and drinks that contain many calories and few nutrients. However, it is difficult to translate the interaction effect that was found in the fast-food restaurant study between overweight status and the response to pricing strategies, to policy development. It seems neither feasible nor desirable to implement pricing strategies in settings that cater uniquely to individuals that are overweight or obese. Further, both the sizeable overweight prevalence and our study results indicating that pricing strategies did not have an adverse effect on people with a healthy weight should be considered. Therefore, a general implementation of pricing strategies seems more realistic and appropriate.

With respect to the implementation of pricing strategies, a study into the feasibility of -amongst others- pricing strategies aimed at portion size identified competition as an important barrier for point-of-purchase settings [14]. In this study, point-of-purchase setting representatives expressed their worries that costumers would go to the competition if they did not feel they are getting value-for-money. It might be the case that portion size interventions should be implemented widely. However, making such agreements is currently prevented by existing competition laws (in order to prevent cartels). It is therefore important that policy makers explore the possibilities for drawing up new legislation to facilitate the implementation of pricing strategies related to portion size.

KEYPOINTS

- Proportional pricing of portion sizes of high caloric food could help people who are overweight or obese to select smaller portion sizes.
- More insight in necessary into the question why people who are overweight or obese might be more responsive to proportional pricing of fast-food items than people with a healthy weight, and whether this is also the case when actual behavior is measured.

- Multiple exposures to or explicit communication of proportional prices might enhance the effectiveness of pricing strategies.
- Public health policy makers should explore the possibilities to facilitate the implementation of pricing strategies.

REFERENCES

1. French SA, Story M, Jeffery RW. Environmental influences on eating and physical activity. *Annu Rev Public Health* 2001; 22: 309-335.
2. Swinburn B, Egger G, Raza F. Dissecting obesogenic environments: The development and application of a framework for identifying and prioritizing environmental interventions for obesity. *Prev Med* 1999; 29: 563-570.
3. Ledikwe JH, Ello-Martin JA, Rolls BJ. Portion sizes and the obesity epidemic. *J Nutr* 2005; 135: 905-909.
4. Nielsen SJ, Popkin BM. Patterns and trends in food portion sizes, 1977-1998. *JAMA* 2003; 289: 450-453.
5. Young LR, Nestle M. The contribution of expanding portion sizes to the US obesity epidemic. *Am J Public Health* 2002; 92: 246-249.
6. Diliberti N, Bordi PL, Conklin MT, Roe LS, Rolls BJ. Increased portion size leads to increased energy intake in a restaurant meal. *Obes Res* 2004; 12: 562-568.
7. Jeffery RW, Rydell S, Dunn CL, Harnack LJ, Levine AS, Pentel PR, Baxter JE, Walsh EM. Effects of portion size on chronic energy intake. *Int J Behav Nutr Phys Act* 2007; 4: 27.
8. Rolls BJ, Morris EL, Roe LS. Portion size of food affects energy intake in normal-weight and overweight men and women. *Am J Clin Nutr* 2002; 76: 1207-1213.
9. Rolls BJ, Roe LS, Kral TV, Meengs JS, Wall DE. Increasing the portion size of a packaged snack increases energy intake in men and women. *Appetite* 2004; 42: 63-69.
10. Rolls BJ, Roe LS, Meengs JS. The effect of large portion sizes on energy intake is sustained for 11 days. *Obesity (Silver Spring)* 2007; 15: 1535-1543.
11. Wansink B. Can package size accelerate usage volume? *J Mark* 1996; 60: 1.
12. Glanz K, Basil M, Maibach E, Goldberg J, Snyder D. Why Americans eat what they do: Taste, nutrition, cost, convenience, and weight control concerns as influences on food consumption. *J Am Diet Assoc* 1998; 98: 1118-1126.
13. Chandon P, Wansink B. When are stockpiled products consumed faster? A convenience-salience framework of postpurchase consumption incidence and quantity. *J Marketing Res* 2002; 39: 321-335.

14. Vermeer WM, Steenhuis IHM, Seidell JC. From the point-of-purchase perspective: A qualitative study of the feasibility of interventions aimed at portion size. *Health Policy* 2009; 90: 73-80.
15. Steenhuis IHM, Vermeer WM. Portion size: Review and framework for interventions. *Int J Behav Nutr Phys Act* 2009; 6: 58.
16. French SA, Jeffery RW, Story M, Breitlow KK, Baxter JS, Hannan P, Snyder MP. Pricing and promotion effects on low-fat vending snack purchases: The CHIPS Study. *Am J Public Health* 2001; 91: 112-117.
17. Horgen KB, Brownell KD. Comparison of price change and health message interventions in promoting healthy food choices. *Health Psychol* 2002; 21: 505-512.
18. Harnack LJ, French SA, Oakes JM, Story MT, Jeffery RW, Rydell SA. Effects of calorie labeling and value size pricing on fast-food meal choices: Results from an experimental trial. *Int J Behav Nutr Phys Act* 2008; 5: 63.
19. Malik VS, Schulze MB, Hu FB. Intake of sugar-sweetened beverages and weight gain: A systematic review. *Am J Clin Nutr* 2006; 84: 274-288.
20. Stender S, Dyerberg J, Astrup A. Fast-food: Unfriendly and unhealthy. *Int J Obes (Lond)* 2007; 31: 887-890.
21. McDonalds. McDonalds Menu. McDonalds 2009.
22. Strien Tv. Dutch Eating Behaviour Questionnaire. Manual incuding child DEBQ (DEBQ-C]. 2nd edn. Amsterdam: Boom Test Publishers; 2007.
23. Wardle J. Eating style: A validation study of the Dutch Eating Behaviour Questionnaire in normal subjects and women with eating disorders. *J Psychosom Res* 1987; 31: 161-169.
24. Lichtenstein DR, Netemeyer, Richard G., Burton, Scot. Distinguishing coupon proneness from value consciousness: An acquisition-transaction utility theory perspective. *J Mark* 1990; 54.
25. Schokker DF, Visscher TL, Nooyens AC, van Baak MA, Seidell JC. Prevalence of overweight and obesity in the Netherlands. *Obes Rev* 2007; 8: 101-108.
26. CPB. CPB Information: most recent short-term forecasts. Retrieved: August, 13, 2008, from http://www.cpb.nl/eng/prognoses/nlinfo.html.
27. RIVM. Nevo Tabel. RIVM; 2006.

28. Hill JO, Wyatt HR, Reed GW, Peters JC. Obesity and the environment: Where do we go from here? *Science* 2003; 299: 853-855.
29. Wansink B. Mindless eating - Why we eat more than we think. New York: Bantam-Dell; 2006.
30. Scheibehenne B, Miesler L, Todd PM. Fast and frugal food choices: Uncovering individual decision heuristics. *Appetite* 2007; 49: 578-589.
31. Visscher TL, Viet AL, Kroesbergen IH, Seidell JC. Underreporting of BMI in adults and its effect on obesity prevalence estimations in the period 1998 to 2001. *Obesity (Silver Spring)* 2006; 14: 2054-2063.
32. Sharpe KM, Staelin R, Huber J. Using extremeness aversion to fight obesity: Policy implications of context dependent demand. *J Cons Res* 2008; 35: 406-422.